Dept of Veterans Affairs Advanced Metering Program

December, 2010

VA ENERGY PORTFOLIO

FY 2009*

- **Approx. 300 facilities subject to mandates (owned, or leased and paying energy bills)**
  - **FY 2009: 155 million square feet (6,000 buildings)**
- **FY 2009 energy and water cost and consumption:**
  - **Energy: $517 million**
  - **29 trillion Btu****
  - **Water: $31 million**
  - **9 billion gallons**

* *Complete FY 2010 data are not yet available*

** *Btu = British thermal unit, a standardized unit for measuring energy. 29 trillion Btu is approximately the amount of energy that 300,000 typical American households consume annually.*

Topics

1. **Advanced Master System Plan**
2. **Pilot Meter System Project**
3. **Electricity Meter Installation Project**
4. **Non-Electricity Meter Project**
5. **Challenges**
6. **Future Plans**

1. Advanced Meter System Plan

- Federal Advanced Metering Requirements
  - Install advanced bldg level electricity meters by 2012
  - Install advanced bldg level non-electric meters by 2015

- Advanced Meter System Plan was developed as a part of VA Energy Action Plan (2006):
  - What Utility lines and Buildings to be metered?
  - What Type of meters to be installed?
  - How to Manage metered data?
  - How to use of metered data?
  - Available funding?
  - Meter installation Project Plan or sequencing?

1. Advanced Meter System Plan – Buildings & Utility

- Buildings to be metered
  - Buildings ≥ 50,000 gsf (covers 73% of total VA sqft)
    - ✓ Electricity Meters
    - ✓ Steam Meters
    - ✓ Chilled Water Meters
  - Buildings using N. Gas - Gas Meters (mainly Central Plants)
  - Buildings ≥ 600K gsf : Water Meters (incl. make up water lines)

- All incoming utility lines to VA campuses to be metered
- All buildings with high energy intensity to be metered

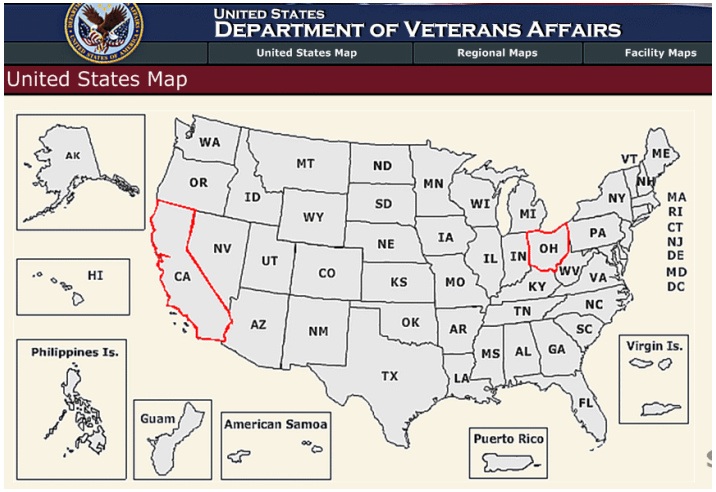
1. Advanced Meter System Plan – Type of Meters

- Type of Meters were specified

  Example:

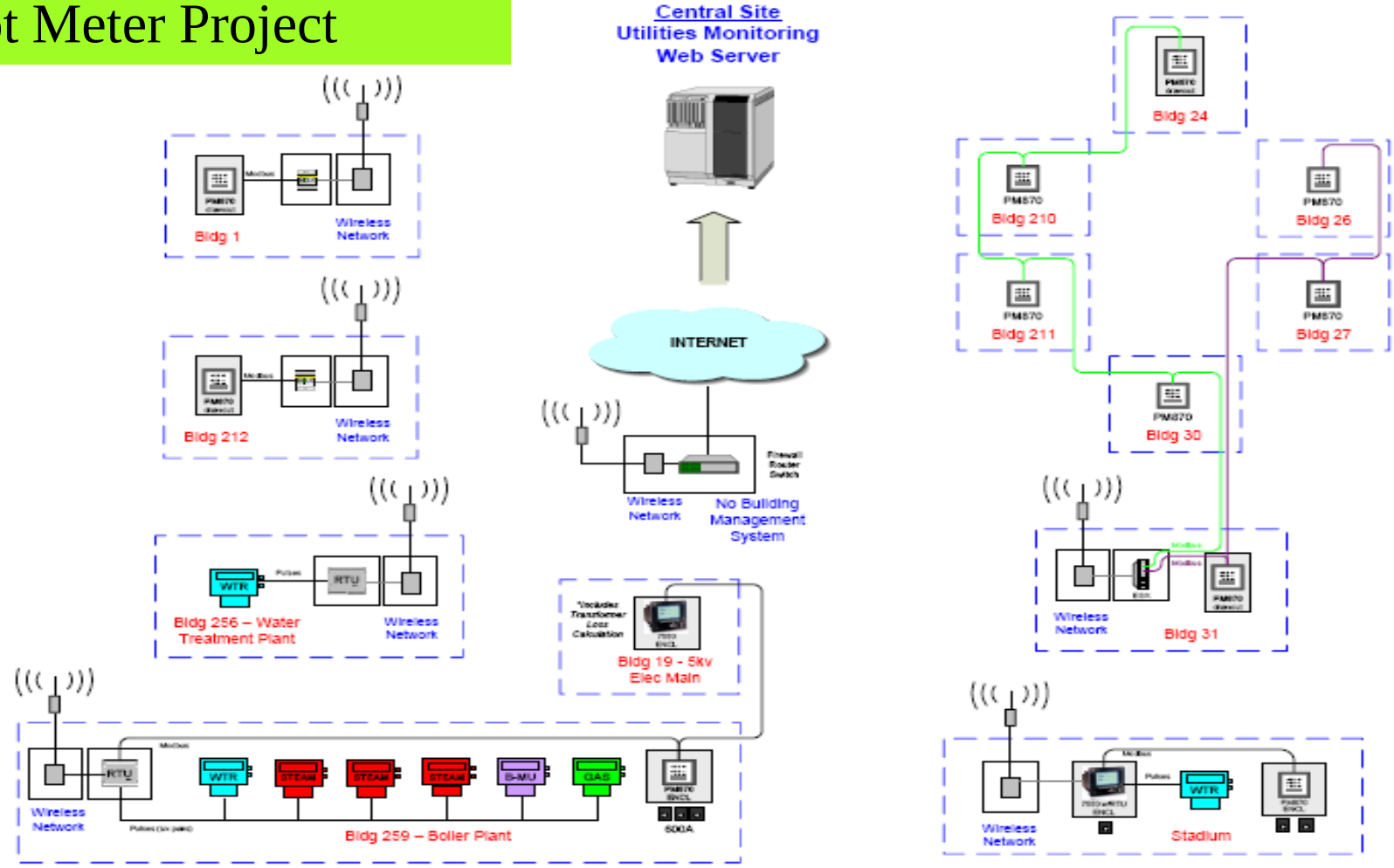
  - Flow Meters for the line that couldn't have outage
    - ✓ Insertion type or
    - ✓ Clamp-on type meters
  - Water lines with lower accuracy (+/- 3%) meters
  - Electricity line with higher accuracy (+/- 1%) meters
  - Flow meters without moving parts were preferred
    - ✓ Vortex Meters
    - ✓ Electro-Magnetic Meters

2. Pilot Meter Project



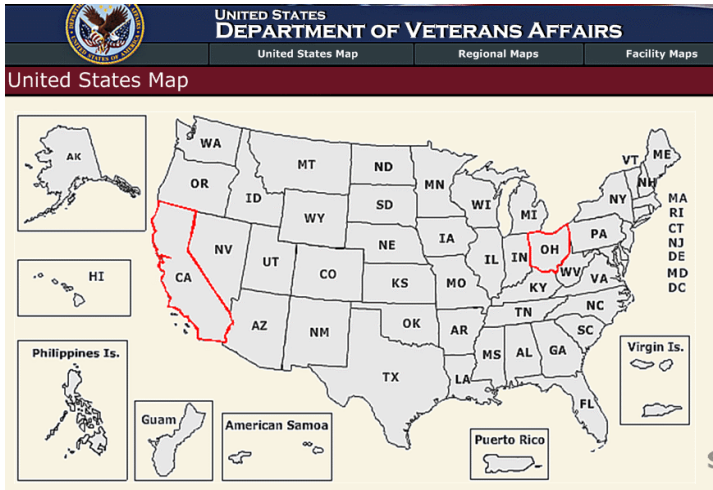
- 2 regions were selected (large, small)
- SOW includes
  - Installation of
    - ✓ Electricity meters
    - ✓ Steam, CHW, Gas, Water (non-electricity) meters
  - Set up Central web-site (collecting data from all meters)
  - Utility Bill Audits
  - And some others
  - Installed around 300 meters from 11 campuses
  - Awarded in FY-2008
  - Completed in FY-2010

Pilot Meter Project

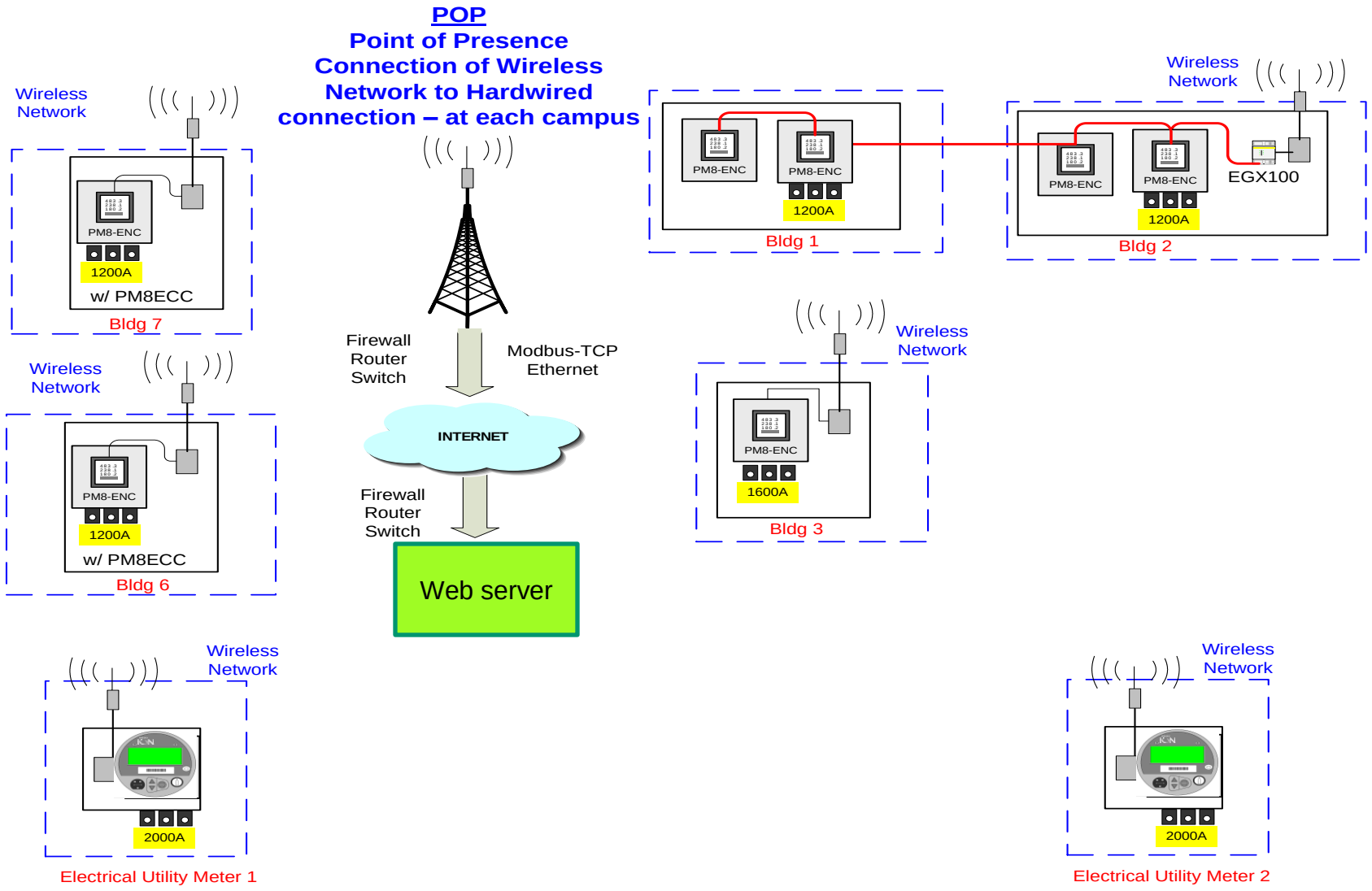


3. National Electricity Meter Project

- ❑ After verified all the pilot sites working properly, started National Electricity Meter project
- ❑ SOW includes
  - ➢ Installation of electricity meters for rest of VA buildings
    - ✓ ≥ 50,000 gsf
    - ✓ With high electricity use
  - ➢ Meter data to be forwarded to Central web-site
  - ➢ Installed total 1,600 meters (located at 160 campuses)
  - ➢ Awarded in FY-2009
  - ➢ 50% of meters installed
  - ➢ Will be completed early 2011



Electricity Meters



4. National Non-Electricity Meter Project

- Used ARRA funding
- SOW includes
  - Installation of non-electricity meters for rest of VA buildings
    - ✓ Steam Meters
    - ✓ Chilled water meters
    - ✓ Natural Gas meters
    - ✓ Water meters
  - 20 Regional contracts – awarded in FY-2010
  - Meter data to be forwarded to Central web-site
  - Total of 3,000 meters (located at 160 campuses)
  - Installation should be completed in 2011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VA National Map

National View

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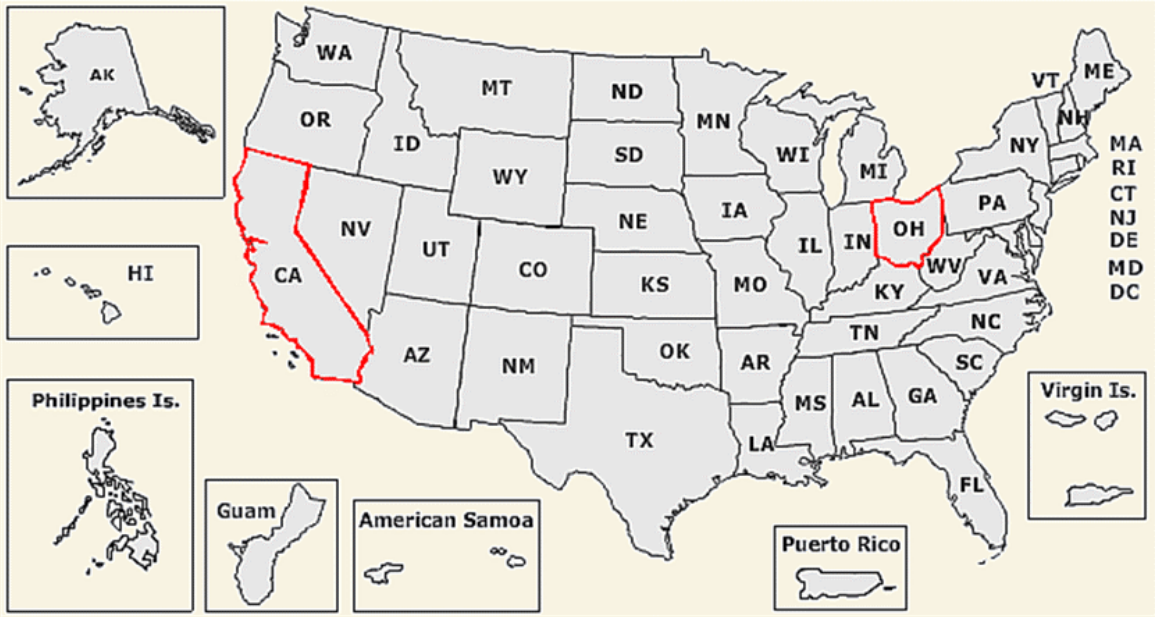

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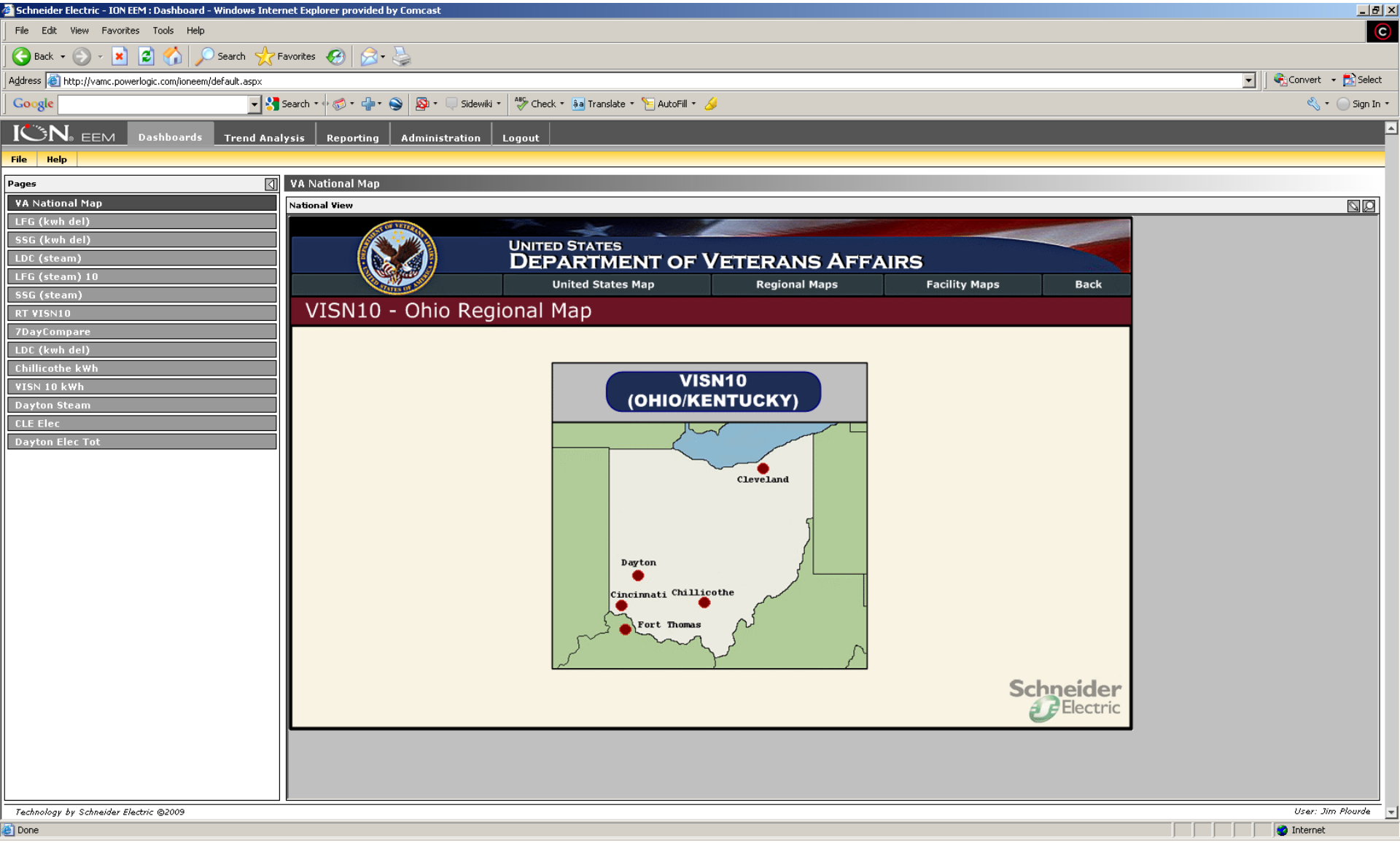

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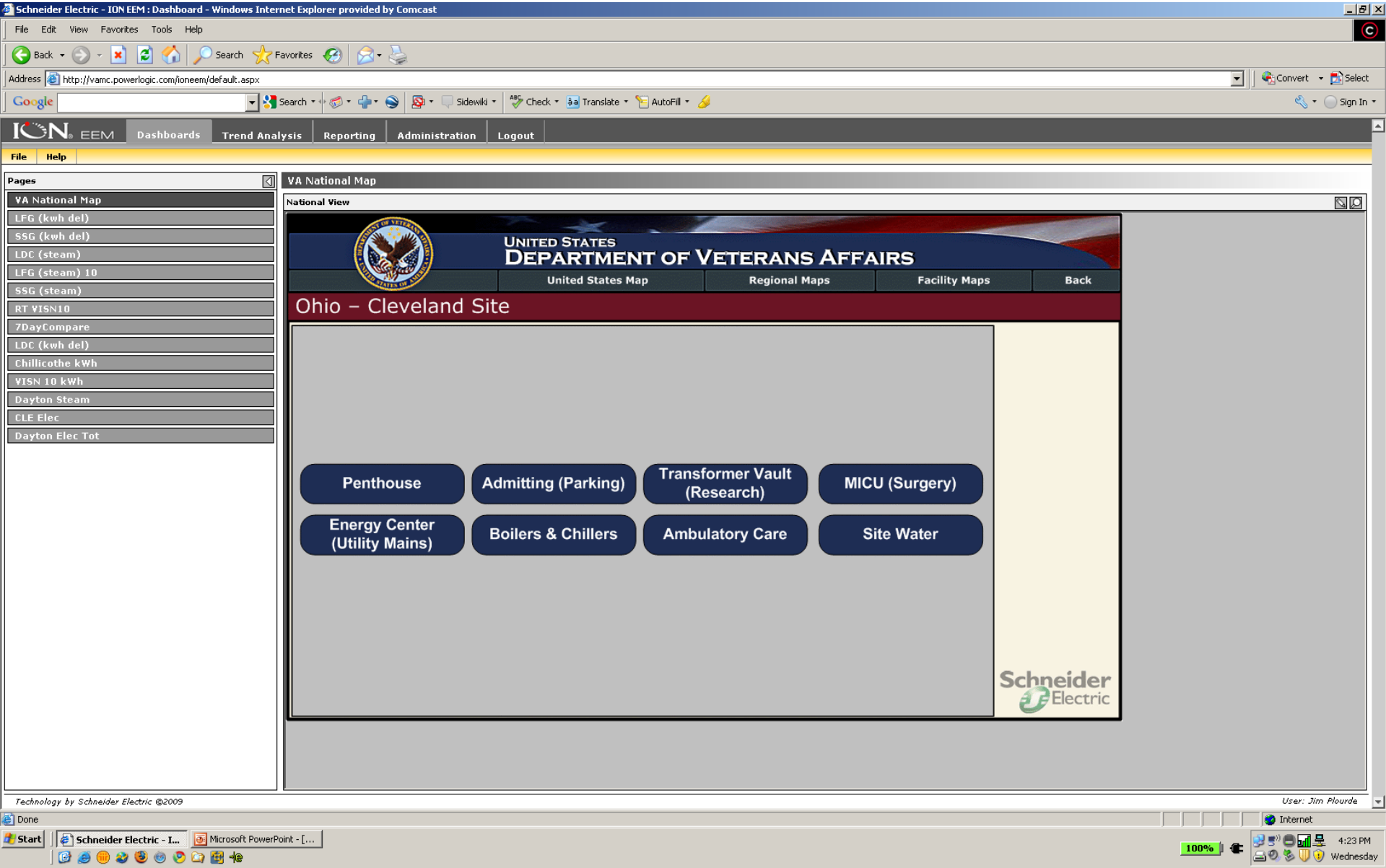


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Nameplate 10-CLE-001-E1AA
Kilowatt Demand (KWd) 3.0
Power Factor (PF) -50.6
Meter Type PM870
Nameplate 10-CLE-001-E1AB
Kilowatt Demand (KWd) 137.0
Power Factor (PF) -93.0
Meter Type PM870
Nameplate 10-CLE-001-E1AC
Kilowatt Demand (KWd) 6.0
Power Factor (PF) 5.7
Meter Type PM870
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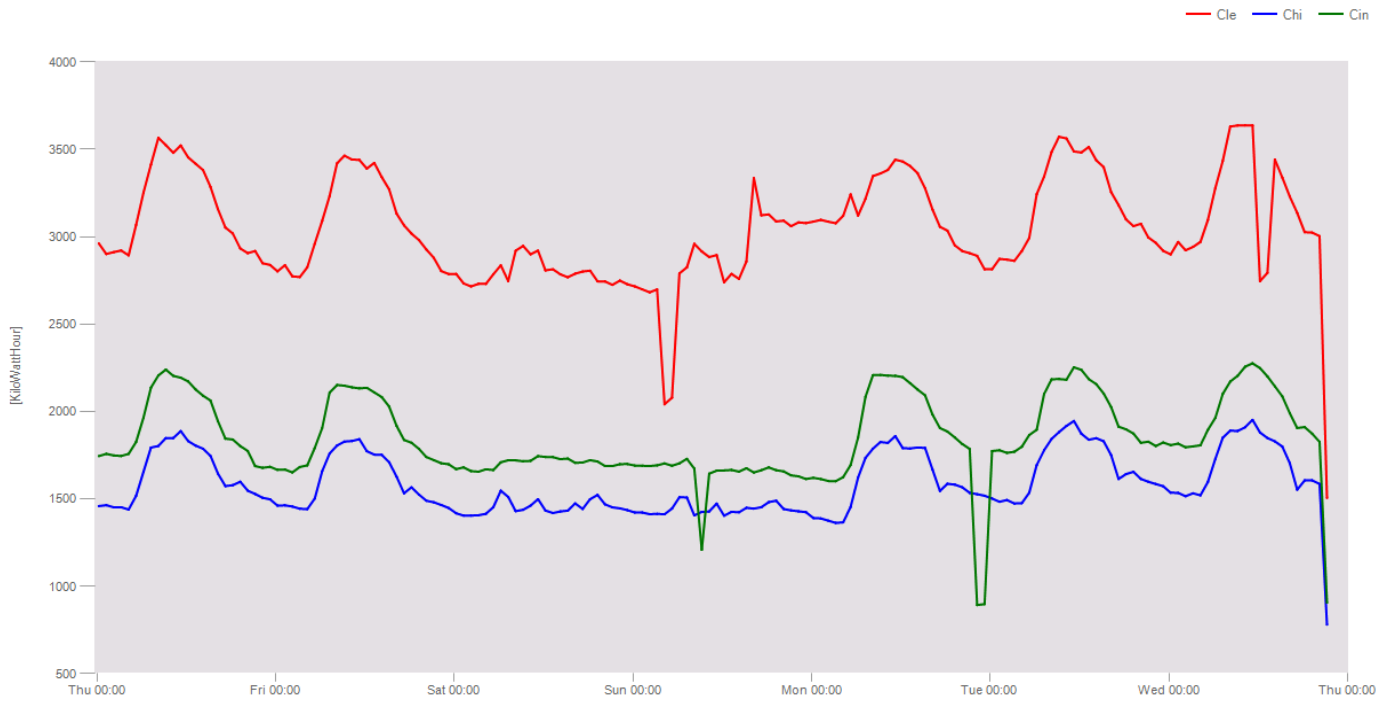
Last 7 Days Site Compare

Last 7 Days Visn 10 — Chart

Jan 21 2010 to Jan 28 2010



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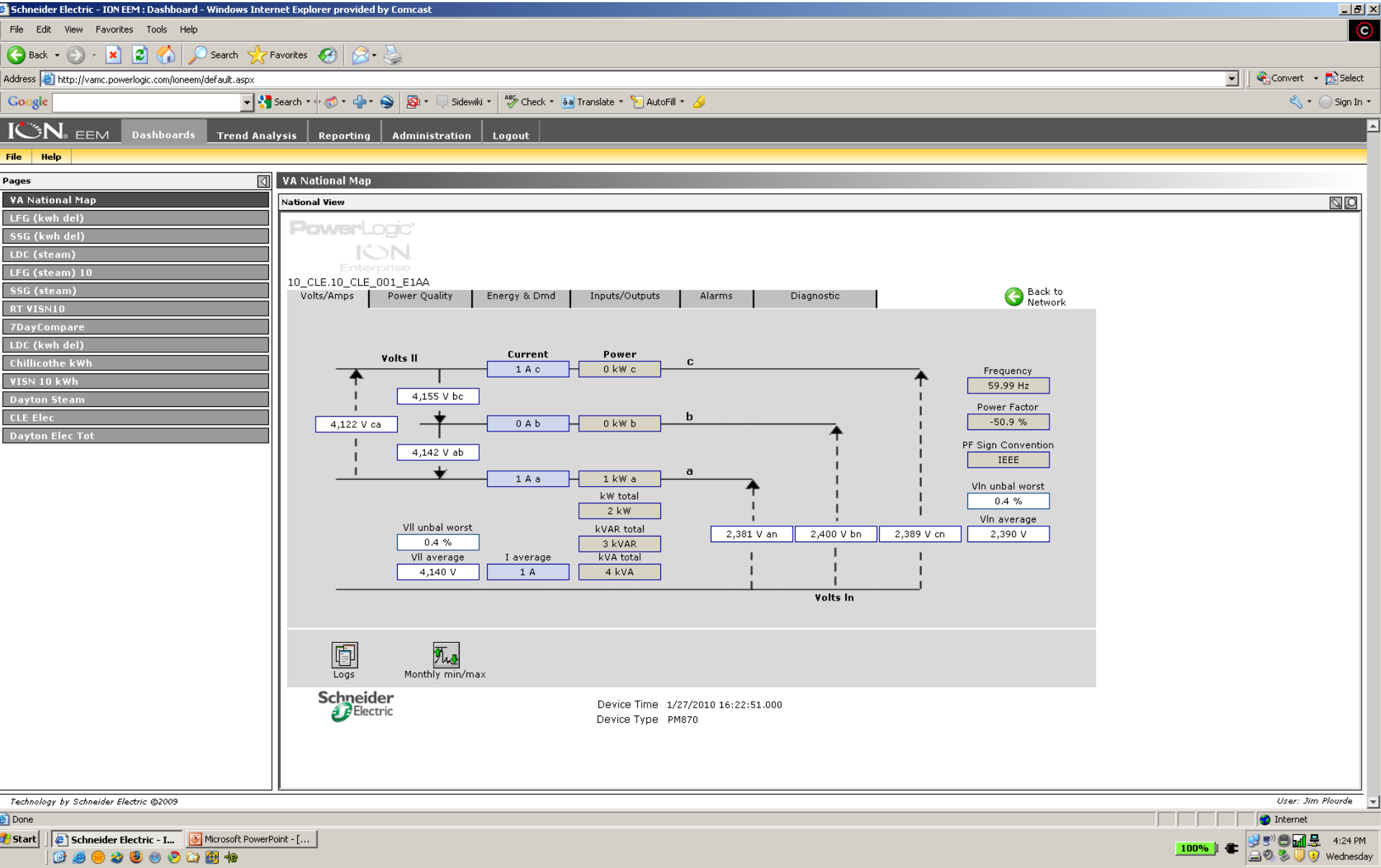

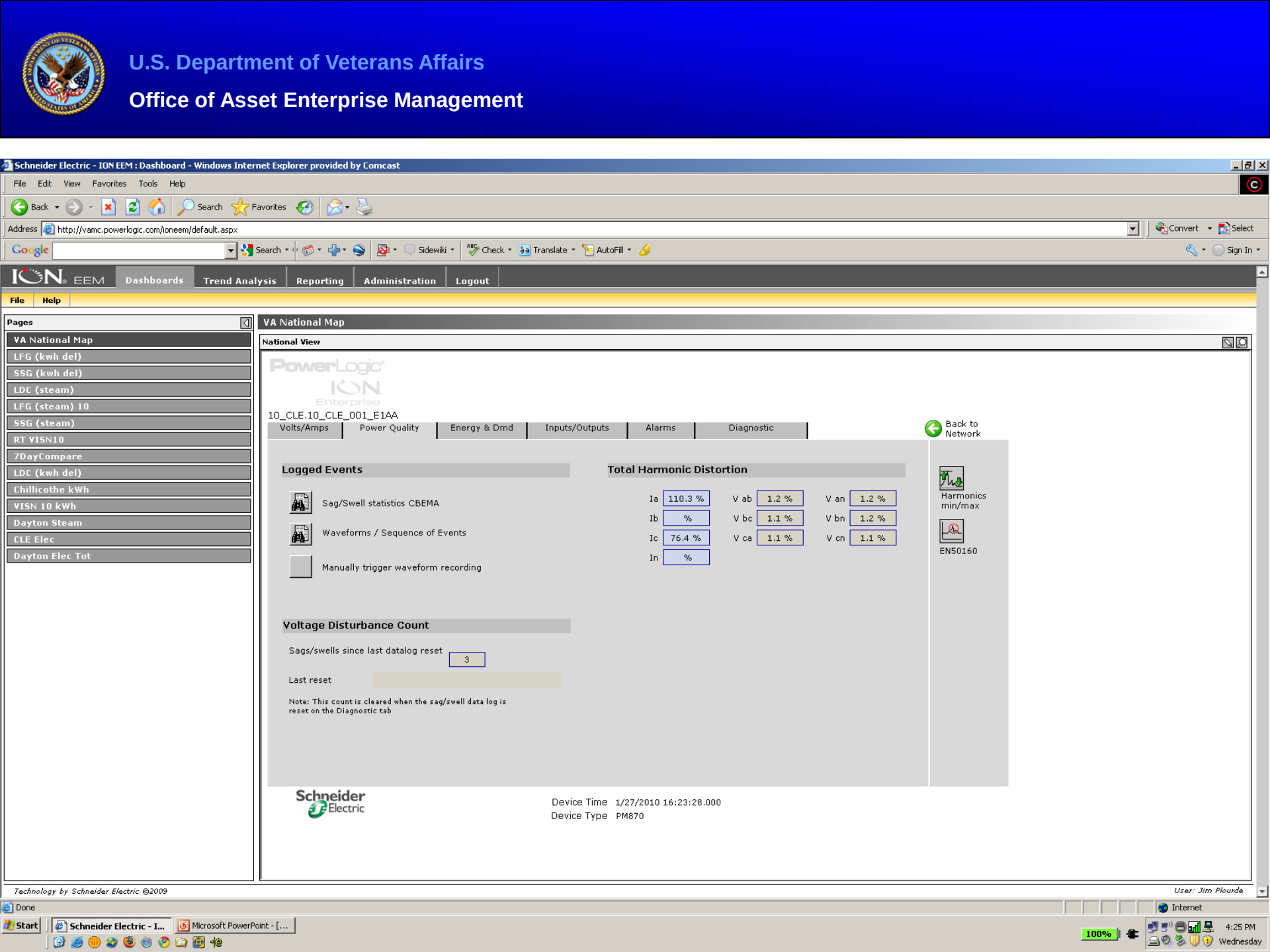
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Inputs/Outputs
Alarms
Diagnostic
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Logged Events
Sag/Swell statistics CBEMA
Waveforms / Sequence of Events
Manually trigger waveform recording
Total Harmonic Distortion
Ia 110.3 %
Ib %
Ic 76.4 %
In %
V ab 1.2 %
V bc 1.1 %
V ca 1.1 %
V an 1.2 %
V bn 1.2 %
V cn 1.1 %
Harmonics min/max
EN50160
Voltage Disturbance Count
Sags/swells since last datalog reset 3
Last reset
Note: This count is cleared when the sag/swell data log is reset on the Diagnostic tab
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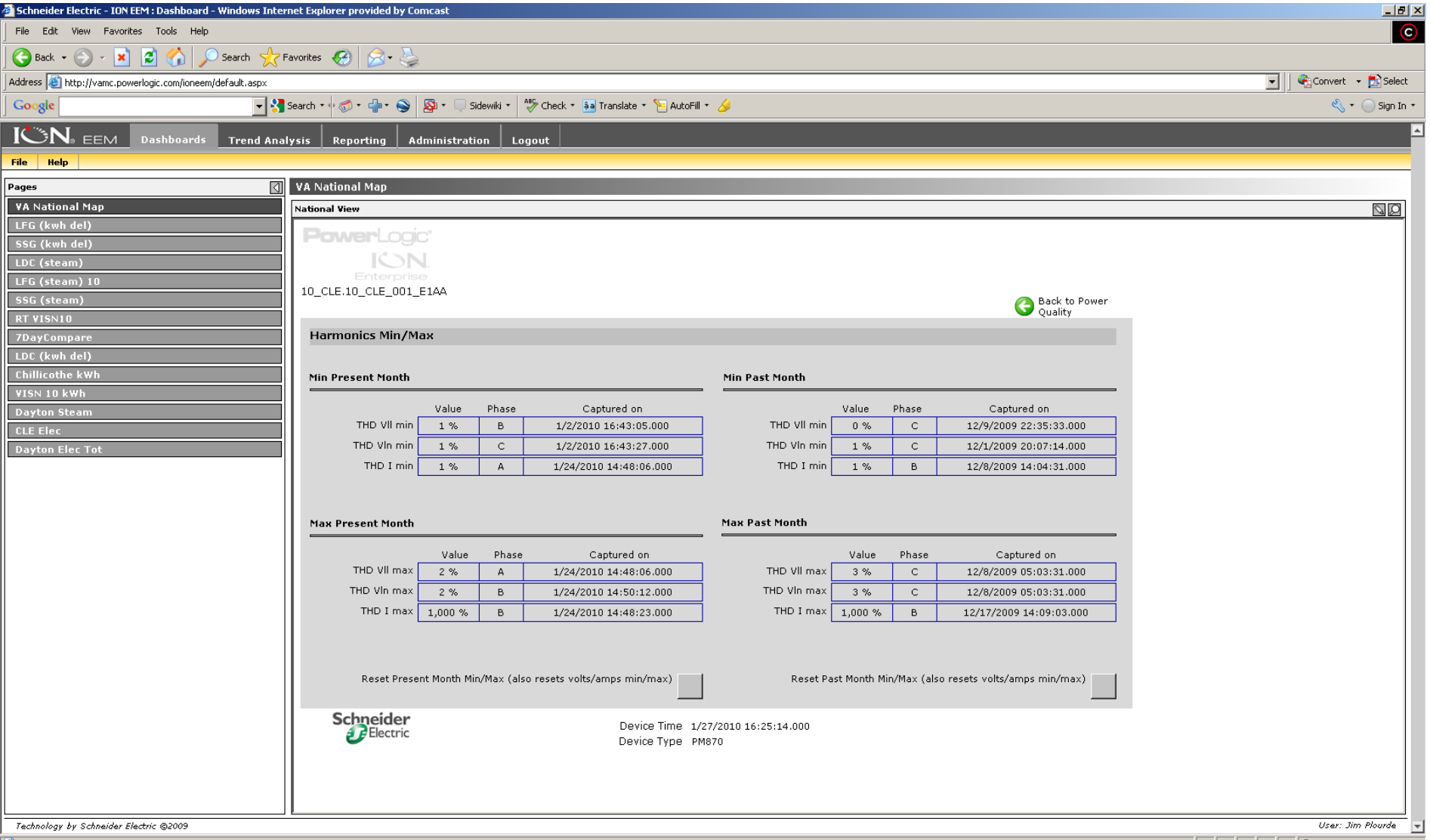
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THD Vll min 0 % C 12/9/2009 22:35:33.000
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THD Vln max 2 % B 1/24/2010 14:50:12.000
THD I max 1,000 % B 1/24/2010 14:48:23.000
Max Past Month
Value Phase Captured on
THD Vll max 3 % C 12/8/2009 05:03:31.000
THD Vln max 3 % C 12/8/2009 05:03:31.000
THD I max 1,000 % B 12/17/2009 14:09:03.000
Reset Present Month Min/Max (also resets volts/amps min/max)
Reset Past Month Min/Max (also resets volts/amps min/max)
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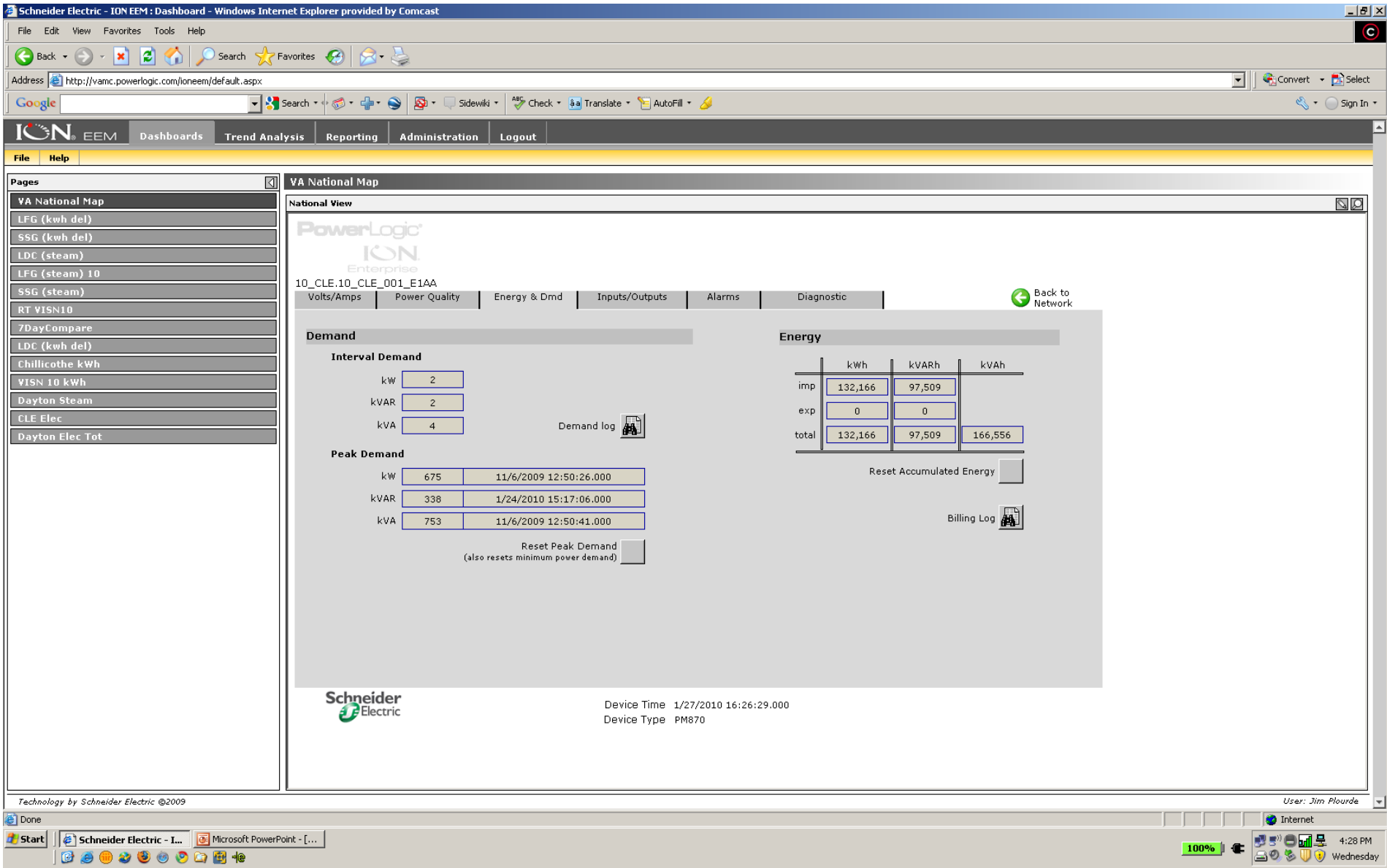

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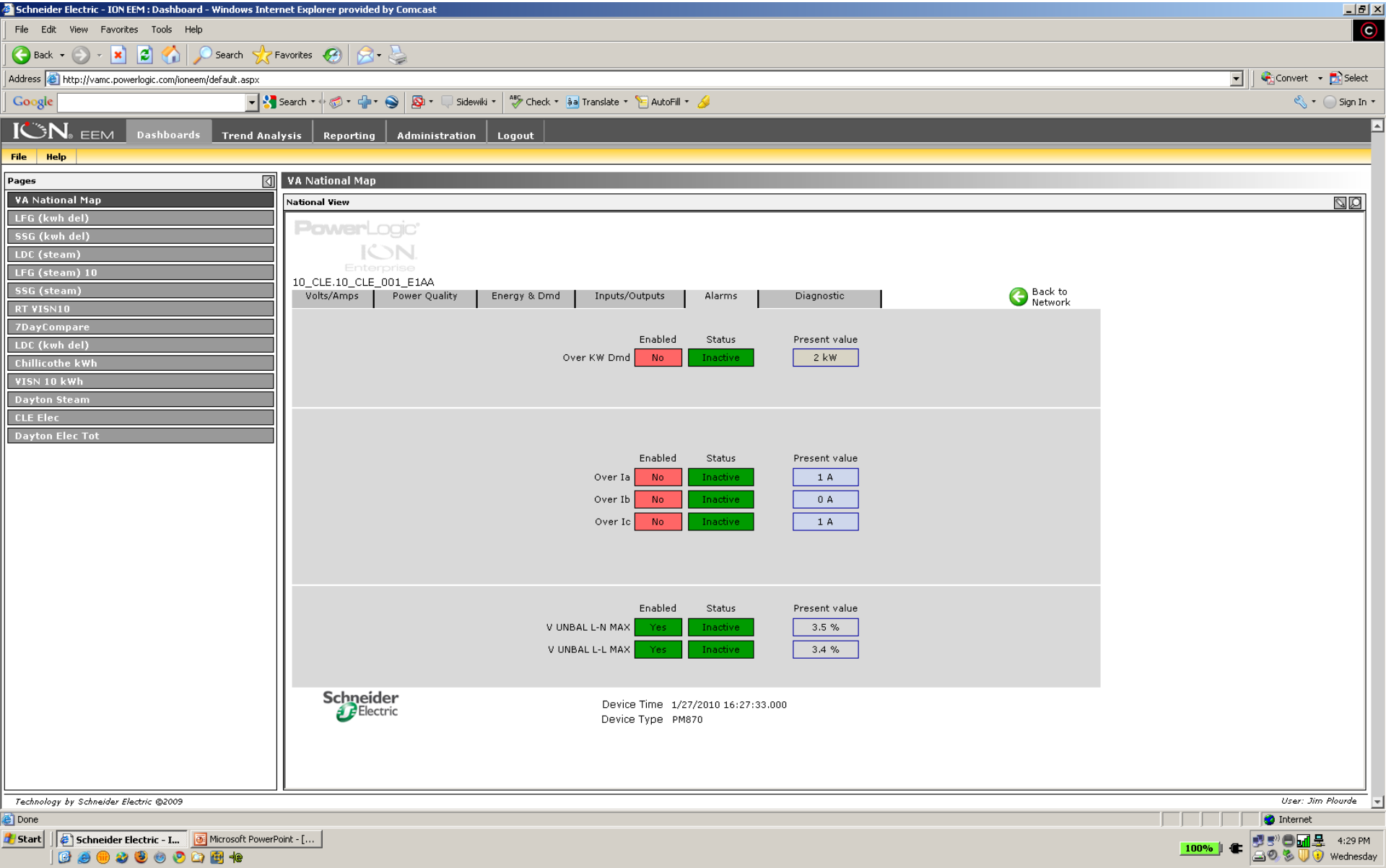

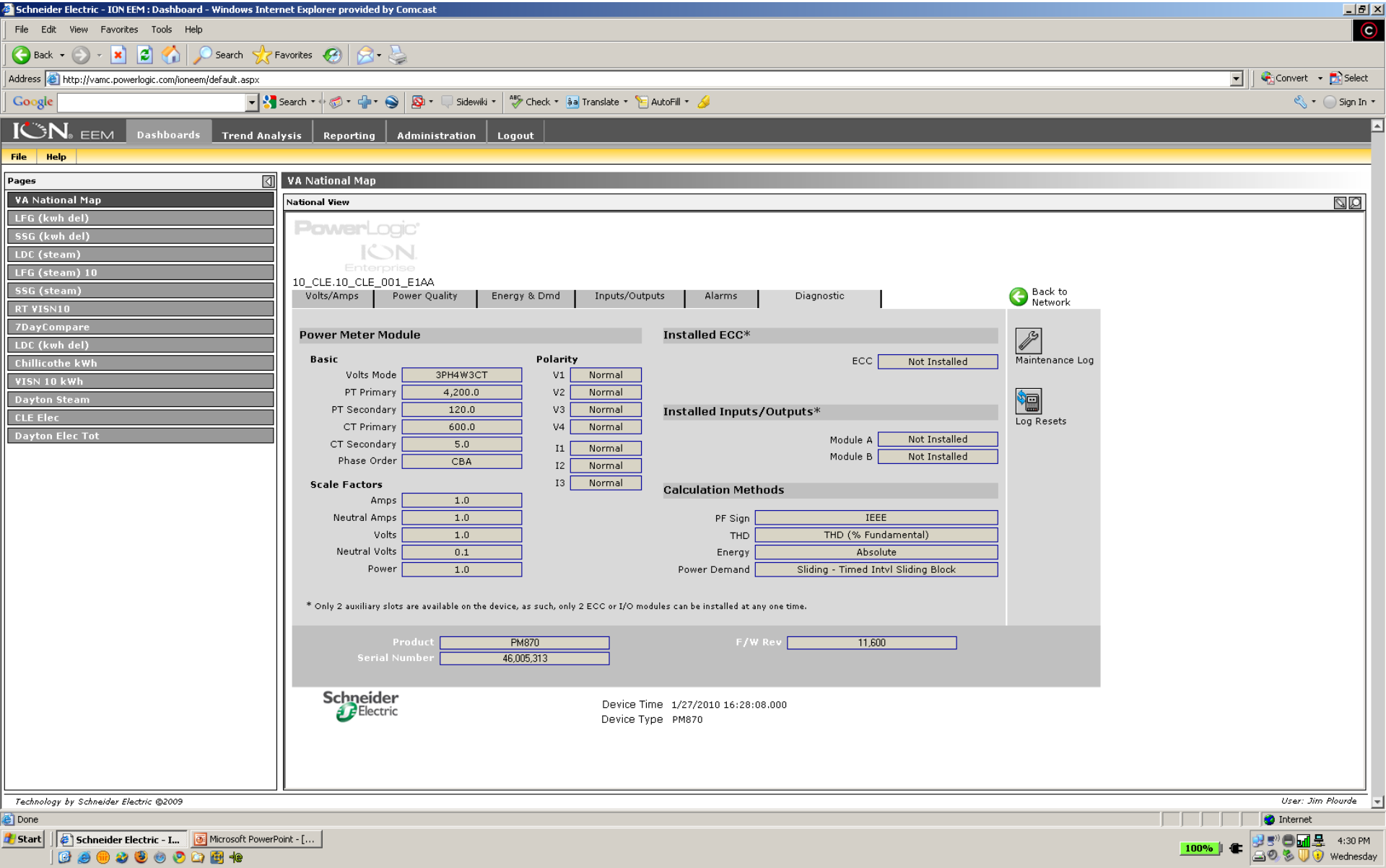
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PT Secondary 120.0
CT Primary 600.0
CT Secondary 5.0
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V2 Normal
V3 Normal
V4 Normal
I1 Normal
I2 Normal
I3 Normal
Scale Factors
Amps 1.0
Neutral Amps 1.0
Volts 1.0
Neutral Volts 0.1
Power 1.0
Installed ECC*
ECC Not Installed
Installed Inputs/Outputs*
Module A Not Installed
Module B Not Installed
Calculation Methods
PF Sign IEEE
THD THD (% Fundamental)
Energy Absolute
Power Demand Sliding - Timed Intvl Sliding Block
* Only 2 auxiliary slots are available on the device, as such, only 2 ECC or I/O modules can be installed at any one time.
Maintenance Log
Log Resets
Product PM870
Serial Number 46,005,313
F/W Rev 11.600
Schneider Electric
Device Time 1/27/2010 16:28:08.000
Device Type PM870
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VISN 10 Load FactorWeek to date

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Load Factor Graph

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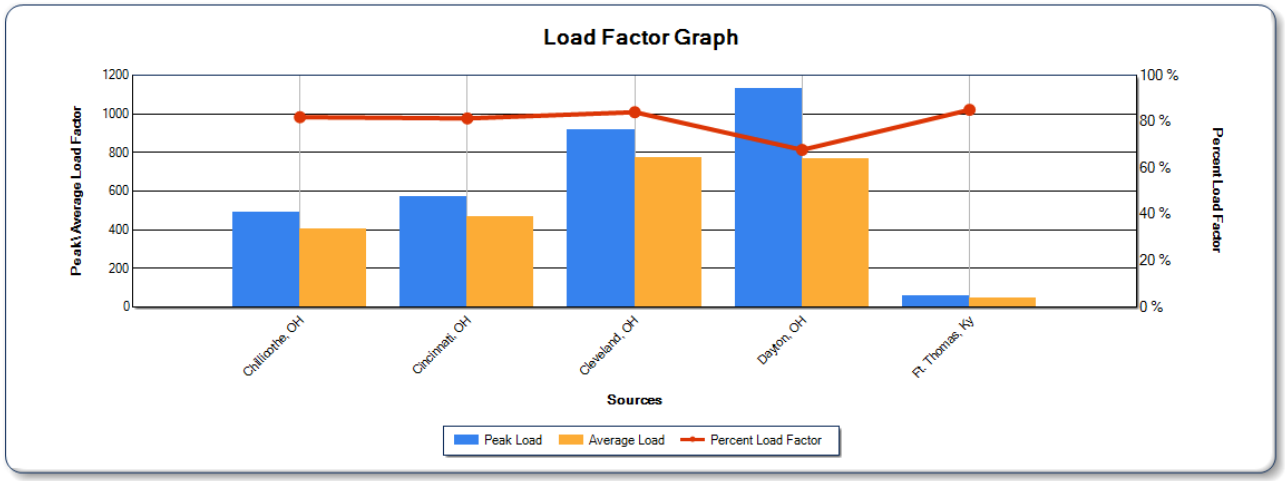

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Summary Statistics Graph (kwh del)

VISN 10 Summary Statistics Graph

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Summary Statistics Graph

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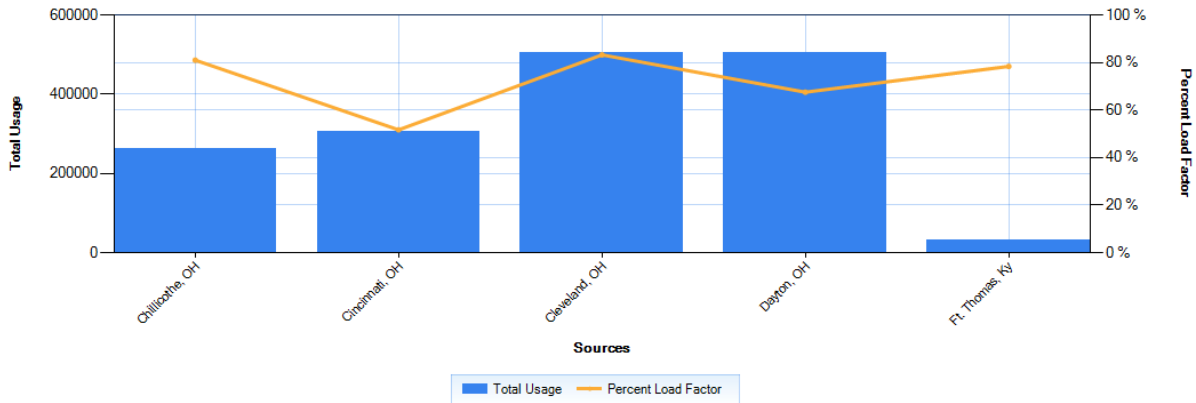
Summary Statistics Total Usage Graph



Summary Statistics Max/Avg./Min. Usage Graph

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- Dayton Elec Tot
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Load Factor Graph (STEAM)

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Load Factor Graph

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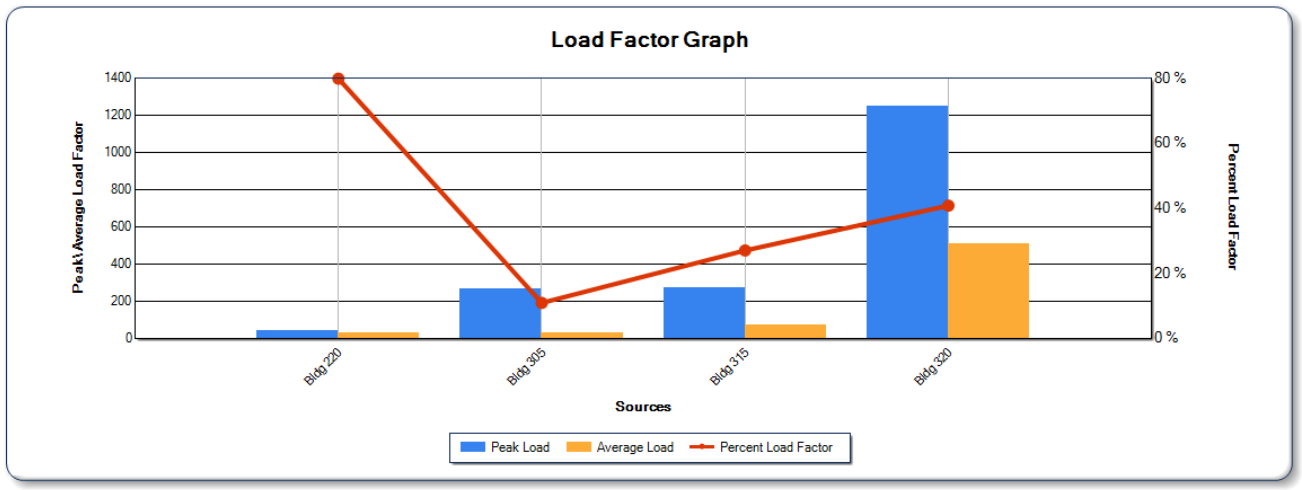

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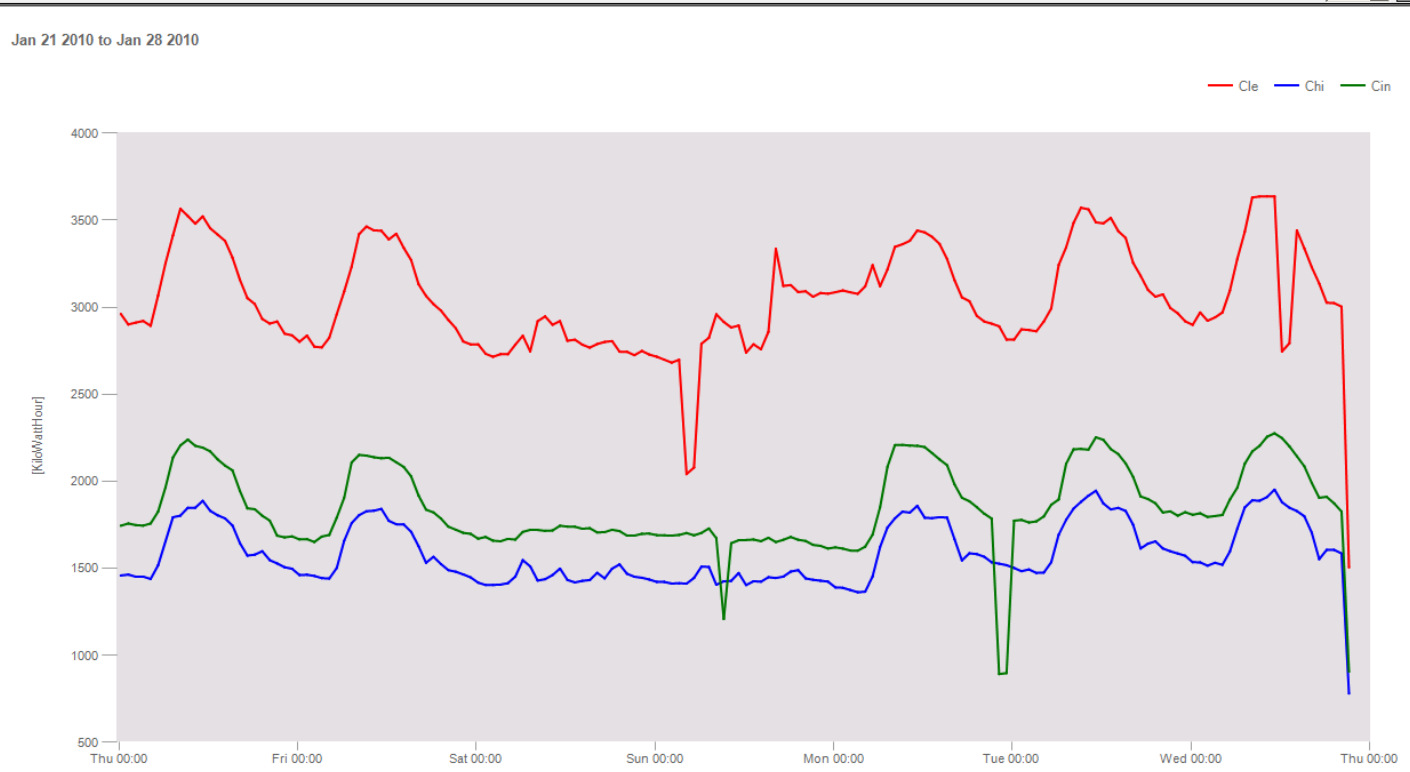
Last 7 Days Site Compare

Last 7 Days Visn 10 — Chart



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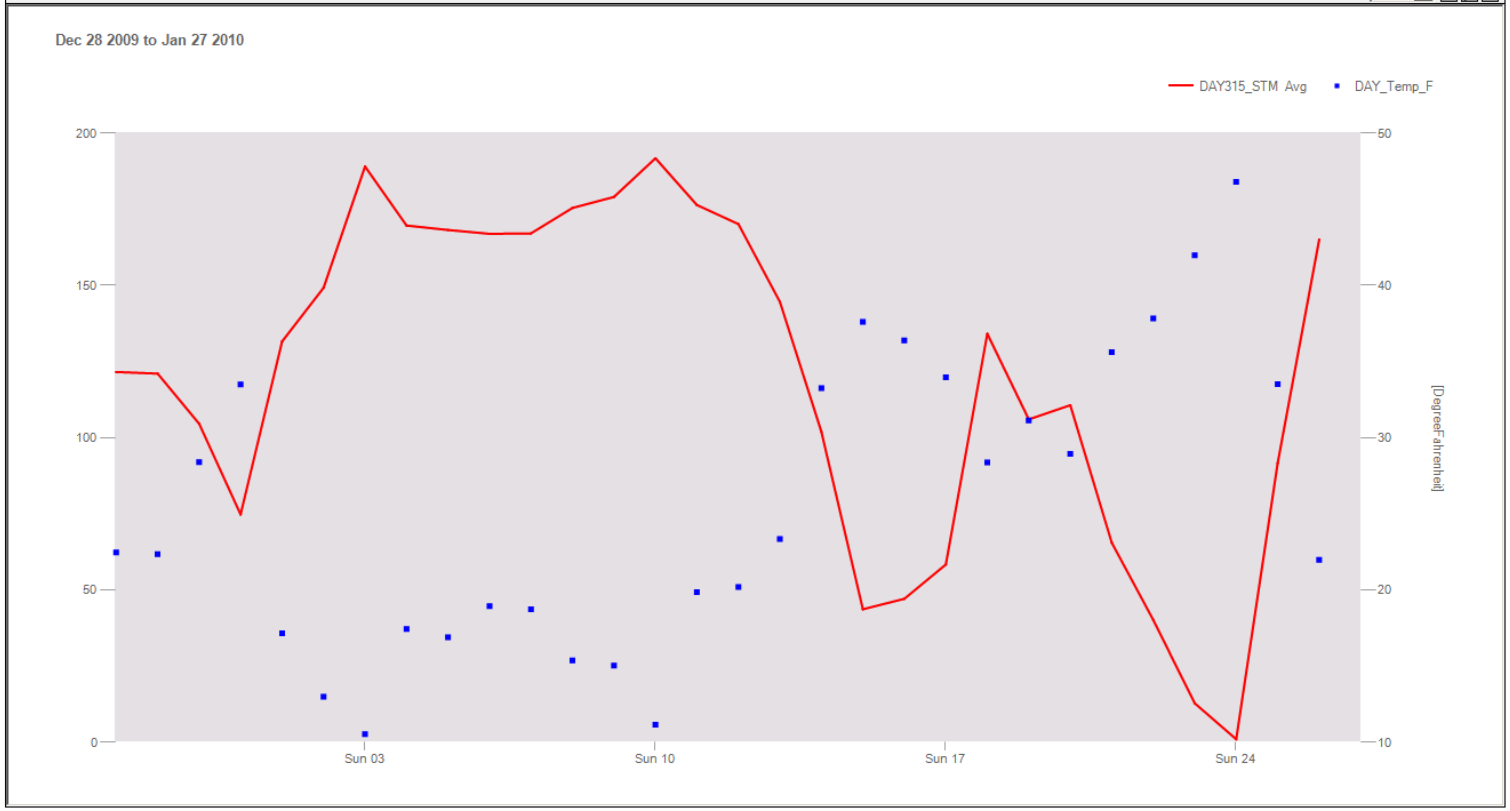
- Dayton Elec Tot
- Training

Dashboard Page Title

DAY315Steam — Chart



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- RT VISN10
- 7DayCompare
- LDC (kwh del)
- Chillicothe kWh
- Dayton Steam
- CLE Elec
- Dayton Elec Tot
- Training

Dashboard Page Title

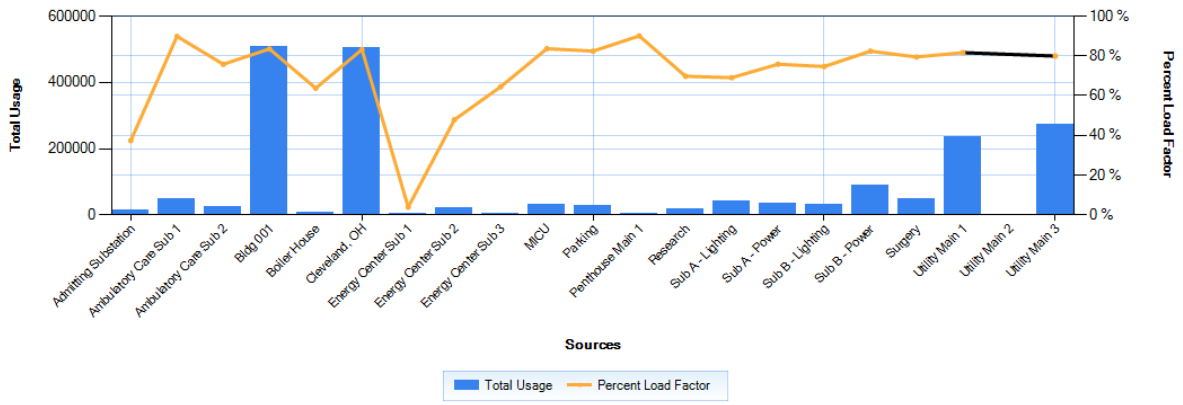
Summary Statistics Elec - CLE

1 of 1 Export As...

Summary Statistics Graph

Date Range: 1/21/2010 12:00:00 AM - 1/28/2010 12:00:00 AM

Summary Statistics Total Usage Graph



Summary Statistics Max/Avg./Min. Usage Graph

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- Dayton Elec Tot
- Training

Dashboard Page Title

Dayton Energy Total — Chart

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5. CHALLENGES

- **Integration of New Meters**
  - New meters installed for
    - ✓ Renewable energy systems
    - ✓ New Construction projects
    - ✓ Installation by local facilities
    - ✓ Existing meters
- No energy savings – not for ESPC, UESC, etc
- No firm data for utility lines to campus, to buildings

Carport PV at McClellan facility

6. Future Plans

- ❑ **Additional Meter installation for smaller buildings**
- ❑ **Facility Energy Managers to analyze metered data**
- ❑ **Feed data to Energy Benchmarking Tool (Energy Star Portfolio Manager) directly**

Questions?

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